

## REMARKS

Reconsideration of this patent application is respectfully requested in view of the foregoing amendments, and the following remarks.

The amendments to this patent application are as follows. Independent claim 7 has been amended to recite that the hub-sleeve element is under the clamping effect of the clamping element. The revised language added to claim 7 is taken from claim 11, which has been cancelled. Claim 12 has been revised to now depend from independent claim 7 rather than from cancelled claim 11. Dependent claim 13 has been cancelled and has been rewritten as newly added independent claim 14 and is based upon a combination of claims 7, 11 and 13.

Newly added claims 15, 16 and 17 depend from independent claim 14, and are based upon, and are supported by, claims 8, 9 and 10, respectively.

The Patent Examiner has rejected claims 7, 8 and 11 - 13 as being anticipated by *Peter* (U.S. Patent No. 3,849,015), newly cited.

The Patent Examiner has stated that *Peter* discloses a shaft-hub connection comprising: an attachment flange (1) having a hub element (hub portion of 1) with a conical region (conical region of 1); a clamping element (1a,2) which is attachable to the attachment flange and by means of which a shaft end (end of 6) assigned to the attachment flange is connectable by frictional connection to the attachment flange; and a bushing (3) positioned between the clamping element and the shaft end to take up a slip torque and designed in multiple parts in its axial direction, and wherein the level of the slip torque which is to be taken by the bushing can be pre-set (e.g. by tightening 5).

This rejection by the Patent Examiner is respectfully traversed. Certain elements of the shaft hub connection disclosed by *Peter* do not have the function stated by the Patent Examiner. For example, the Patent Examiner has argued that in the drawing of *Peter's* shaft-hub connection reference numeral 1 denotes an "attachment flange". However, in fact reference numeral 1 denotes an inner clamping ring. This inner clamping ring has a no attachment flange, but a centering flange 1c (Please see column 4, lines 5 - 13).

More particularly, *Peter et al.* (U.S. Patent No. 3,849,015) discloses in column 1, lines 13 to 19, a hub-to-shaft clamping connection to secure a hub to a shaft, in which the connection utilizes two paired inner clamping rings having outer conical surfaces and paired outer clamping rings having corresponding, matching inner conical surfaces, the clamping rings being tightened against each other by means of clamping bolts.

*Peter et al.* further discloses in column 2, lines 28 to 42, pairs of inner and outer clamping rings that are provided, having, respectively, outer and inner conical surfaces. The inner rings have an interior relief in which a sleeve is press fitted. The sleeve has an outwardly directed flange fitting into, or against the inner end facing surfaces of the inner sleeves. The press fitted sleeve is made of a material which, under emergency condition, can act as a bearing, that is, can provide slippage between the shaft and the hub-to-shaft connection (which, due to the greater circumference of the outer rings, is usually tight in the hub). The material, therefore, should be softer than the material of the shaft (usually steel) to prevent scoring or damage to the shaft. Further, and since it is press fitted, it should be replaceable from the inner rings.

Indeed, *Peter* discloses a symmetrical hub-to-shaft clamping connection to secure a hub (7) to a shaft (6), in which the connection utilizes two paired inner clamping rings (1, 1 a) having outer conical surfaces and paired outer clamping rings (2, 2) having corresponding, matching inner conical surfaces. The clamping rings (1, 2; 1 a, 2) are tightened against each other by means of clamping bolts (5).

Again, the argumentation of the Patent Examiner is respectfully traversed. A person skilled in the art will consider the symmetrical hub-to-shaft clamping connection disclosed by *Peter* in its entity. The expert understands the technical terms used in the description in connection with the drawing. Accordingly, the expert recognizes that the inner clamping rings (1, 1 a) form a pair of clamping elements which have the same function. A person skilled in the art would not conclude that the first inner clamping ring (1) constitutes an attachment flange while the second corresponding inner clamping ring (1a) shall not be an attachment flange, but a clamping element.

The shaft-hub connection according to the present invention differs from this known symmetrical hub-to-shaft clamping connection in several features. In order to better distinguish

the shaft-hub connection according to the invention from the cited prior art, the present claims have been amended.

Amended independent claim 7 relates to the embodiment shown in FIG. 1, while newly added independent claim 14 relates to the embodiment shown in FIG. 2.

As stated above, Claim 7 has been amended to change the term "hub element" to "hub-sleeve element (3)". This feature is disclosed in particular in the claims 4 and 5 as originally filed (*...a hub-sleeve element (3), which is under the clamping effect of the clamping element (6), is assigned to the shaft end (2). ... the hub-sleeve element is implemented in one piece with the attachment flange (1) and extends essentially over the length of the bushing (4).*). In this context, please compare also paragraphs 0014J and 0016 of the patent application publication US 2004/0105717 A1 and amended FIG. 1 (Replacement Sheet).

In addition, claim 7 has been amended to recite the limitation that the bushing (4) is positioned between said hub-sleeve element-3, i.e. the hub-sleeve element (3) of the attachment flange (1), and said shaft end to take up a slip torque, wherein said hub-sleeve element (3) is under the clamping

effect of the clamping element (6) which is attachable to the attachment flange (1).

As already mentioned above, *Peter* does not disclose an attachment flange, but inner clamping rings (1, 1a) each having a centering flange (1c). The flanges (1c) of the inner clamping rings (1, 1a) do not serve as attachment flanges for attaching thereto another part, but only as centering flanges for centering the inner clamping rings (1, 1a) within the bore of the hub (7). For this purpose the outer diameter of the flanges (1c) is slightly greater than that of the nominal diameter of the outer conical rings (2, 2).

Furthermore, in amended claim 7 a distinction is made between the attachment flange (1) having a hub-sleeve element (3) and a clamping element (6) which is attachable to said attachment flange (1). Thus, it is clear that the attachment flange (1) and the clamping element (6) are different parts of the shaft-hub connection according to the claimed invention. Particularly, it is clear that the hub sleeve element (3) and the clamping element (6) are different parts.

Amended claim 7 recites that a bushing (4) is positioned between the hub-sleeve element (3) and said shaft end, and that said bushing (4) is designed in multiple parts in its axial direction. That means that at least two separate bushing parts are positioned axially adjacent between said shaft end and said hub-sleeve element (3) of the attachment flange (1).

In the symmetrical hub-to-shaft clamping connection disclosed by *Peter*, however, only one single bushing (i.e. sleeve 3) is positioned between the respective inner clamping ring (1 or 1a) and the shaft end (6).

With respect to cancelled dependent claim 13 (now new independent claim 14), filed in response to the first Office Action, the Patent Examiner has argued that a unitary piece may comprise many parts (or sections), which are not separated from one another within the broadest reasonable interpretation of the claim language.

It is agreed with the Patent Examiner that a unitary piece may comprise many sections, which are not separated from one another. However, this is not the case with respect to claim 13 (now claim 14), where the expression "said hub-sleeve element is

implemented in multiple parts, with one part being implemented in one piece with said attachment flange (1) and the other part (3) being assigned as a sleeve-shaped hub core to said shaft end (2)" is recited.

Therefore, in order to overcome this prior art rejection by the Patent Examiner, the new independent claim 14 is presented and is directed to the embodiment shown in FIG. 2. New claim 14 defines that the shaft-hub connection according to the invention comprises

a hub-sleeve element which is implemented in multiple parts, with a first part having a conical region and being implemented in one piece with said attachment flange (1) and another part (3) being assigned as a sleeve-shaped hub core to said shaft end (2); and

a bushing (4) positioned between said first part of the hub-sleeve element and said another part (3) of the hub-sleeve element to take up a slip torque and designed in multiple parts in its axial direction.

From this new independent claim 14, it is clear that the hub-sleeve element is implemented in at least two parts which are



separated from one another since the bushing (4) is positioned between them.

The deficiencies in the teachings of the primary reference to *Peter* are not overcome by the disclosures of the secondary references to *Clifton* and to *Richardson*.

*Clifton* (U.S. Patent No. 5,599,129) discloses in column 1, lines 5 to 11, connectors of the type having an internal load limiting mechanism causing the connector to fail at a predetermined approximate tensile load. In particular, *Clifton* relates to load limiting connectors for use in directional drilling or other applications where it is necessary or desirable to initiate failure in the connector when subjected to a predetermined tensile load.

*Clifton* further recites in column 2, lines 6 to 12, a load limited connector which overcomes the short comings of the prior devices and methods through the incorporation of a structure which is designed and calibrated to fail at a predetermined approximate tensile load. *Clifton* also provides a load limited connector that may be calibrated to fail at different

predetermined approximate tensile loads so that it may be used in a variety of different applications.

*Clifton* also recites in column 3, lines 19 to 40, referring to FIG. 1, a load limited connector denoted generally by the numeral 1. The connector 1 comprises primarily a main body 2, a pin chamber 3, and a secondary body 4.

Referring to FIGS. 1 and 2 of *Clifton*, main body 2 has first and second ends, 5 and 6 respectively, with first end 5 including first attachment means 7 and second end 6 including a central bore 8. In the preferred embodiment, first attachment means 7 comprises a lug 9 having a central hole 10. Lug 9 would typically be used to attach main body 2, and hence connector 1, to a swivel on the rear of a cutter in a directional drilling application.

Referring now to FIGS. 1 and 3 of *Clifton*, pin chamber 3 is shown to be constructed so as to be received within central bore 8 of main body 2. Pin chamber 3 also includes a central bore 11 and at least one passageway 12 through its rear face 16. Pin chamber 3 is received within central bore 8 of main body 2 such that passageways 12 align with longitudinal passageways 13 in

main body 2. Passageways 12 and longitudinal passageways 13 together comprise pin passageways 14 for receiving a breakaway pin 15.

Thus, *Clifton* relates to connectors which are designed to fail at a certain tensile load. Hence, *Clifton* fails to teach or to suggest the claimed invention, because *Clifton* is nonanalogous prior art.

*Richardson* (U.S. Patent No. 5,970,932) discloses in column 1, lines 32 to 40, a panhead style rocker arm assembly that has a rocker arm with a solid cylindrical section. A pushrod level extends perpendicular to a longitudinal axis of the solid cylindrical section and is attached to a first end of the solid cylindrical section. A valve level extends from a second end of the solid cylindrical section. A bushing matingly fits around the solid cylindrical section. A pair of guides fit over the bushing and attach to a cylinder head.

Thus, *Richardson* relates to a rocker arm assembly. Hence, *Richardson* fails to teach or to suggest the claimed invention, because *Richardson* is nonanalogous prior art.

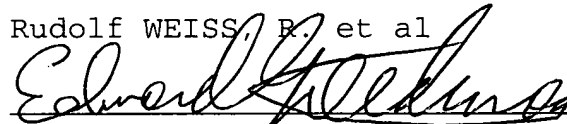
For all the reasons set forth above, none of the prior art references provide an identical disclosure of the claimed invention. Hence, the present invention is not anticipated under 35 U.S.C. 102. Withdrawal of this ground of rejection is respectfully requested.

In summary, claims 7 and 12 have been amended; claims 11 and 13 have been cancelled, and new claim 14 to 17 have been added.

In view of these amendments, the present invention, and all the claims, are firmly believed to be patentable under 35 U.S.C. 103 over all the prior art applied by the Patent Examiner. Withdrawal of this ground of rejection is respectfully requested. A prompt notification of allowability is respectfully requested.

Respectfully submitted,

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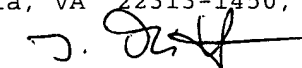


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Enclosure: Copy Petition for Two Month Extension of Time-Small Entity

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on March 18, 2005.

  
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